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Urceolariidae from fresh-water and terrestrial molluscs in Poland

Urceolariidae słodkowodnych i lądowych mięczaków Polski

Continuing our studies on *Urceolariidae* from the Baltic-Sea molluscs, we payed attention to these protozoans from the mantle cavity of the fresh-water and terrestrial molluscs of Poland. While carrying out our investigations, we inspected a considerable amount of *Gastropoda* and *Lamellibranchiata* material, and we based our research on both our previous experience and materials collected in connection with studies on *Thigmotricha*.

We ought to consider ourselves sufficiently well acquainted with the species of the genera *Unio*, *Anodonta*, *Pisidium*, *Sphaerium* and *Dreissena* of *Lamellibranchiata* as well as the species of the genera *Viviparus*, *Valvata*, *Bithynia*, *Bithynella*, *Lithoglyphus* and *Theodoxus* of *Prosobranchia*, many species of the families *Lymnaeidae*, *Physidae*, *Planorbidae* and *Ancylidae* of the fresh-water *Pulmonata*, and — among the terrestrials — first of all: *Limacidae*, *Arionidae* and *Helicidae*. Among all of these molluscs we came so far across the following representatives of the *Urceolariidae* family only: *Trichodina unionis* Hampl 1955 — in *Unio* sp. sp. and in *Anodonta* sp. sp.; *Trichodina baltica* Quen. 1869 — in *Theodoxus fluviatilis*; *Trichodina tranquilis* sp. n. — in *Planorbis planorbis*, and *Semitrichodina sphaeronuclea* (Lom 1956) — in *Bielzia coerulans*. We certainly do not consider our investigations on *Urceolariidae* of terrestrial and fresh-water molluscs as completed and no negative conclusions may be drawn as to the absence of *Urceolariidae* in the individual groups of molluscs, and even so in those species we failed of success in investigating.

Urceolariidae of the fresh-water and terrestrial molluscs are not sufficiently known generally (see Raabe J. et Z. 1959). The literature available mentions solely: *T. unionis* Hampl 1955, and *T. baltica* Quen. 1869 of the water molluscs, and *Semitrichodina sphaeronuclea* (Lom 1956) of the terrestrial forms*. However, investigations on the mollusc material (especially on the fresh-water one) may be expected to result in new data; this would follow from Richards' 1956 having confirmed four species from *Physella* sp. sp. and *Helisoma* sp. sp. of North America: *Trichodina brevirostris*,

* Simultaneously with us, Kazubski 1961 has described a new species: *Semitrichodina convexa* from the land snail *Cochlodina laminata* (Mont.) — Acta Parasit. Polon., 9, 1961.

T. chlorophora, *T. helisomarum*, and *T. physellarum*. Unfortunately, due to the complete lack of any descriptions, the denominations mentioned by Richards must be regarded as *nomina nuda*.

The material for the work reported here was collected by means of dissections of the molluscs; the examinations were carried out *in vivo*, and on fixed preparations, mainly conserved in Schaudinn's liquid and stained with Meyer's acid haemalaun and with iron haematoxyline after Heidenhain, and AgNO₃ impregnated after Klein. Particularly good and irreplaceable results were obtained with the latter method much the same as in our previous experience.

Trichodina baltica Quennerstedt 1869

It was mentioned in a previous work (Raabe et Raabe 1959) that we never came across this species in typical fresh water, but exclusively in brackish one or in water exhibiting a more or less obvious relation to brackish conditions. We systematically used to find this species — described by Quennerstedt from "*Neritina*" from the Baltic Sea at Visby, both in the brackish waters of the Baltic Sea with its bays (Gulf of Gdańsk, Puck Bay with 5 to 7 pro mil. salt contents), and in the lagoon formed by the Vistula (1 to 4 pro mil. salt), as well as in the Żarnowieckie Lake, Pomerania; although its water is practically completely sweet, still it is somehow related to the Baltic Sea through the Piaśnica rivulet. Also in brackish water of the Gulf of Kiel this species has been reported by Precht 1935. According to the data available to us at that time, *Theodoxus* did not happen to be infected with *Trichodina baltica* Quen. in areas situated further off the sea, namely in the Lakes of Mazury Land, in the Vistula near Warszawa, etc. Also in any other snail of the typically fresh waters of Poland, we never found *T. baltica* Quen. disregarding its occurrence — in the Puck Bay — besides *Theodoxus* also in *Hydrobia* sp. sp. and in *Limnaea ovata baltica*. As regards the latter fact, striking is that we never found *T. baltica*, even not in *Limnaea ovata* in the small fresh water bodies in the Hel Peninsula with doubtless and frequent contact with the brackish water of the Puck Bay. On grounds of these observations we admitted *Trichodina baltica* Quen. to be a brackish species, not accompanying its host beyond these surroundings.

However, we are inclined to change this opinion in the light of new investigations.

Although we still failed to find *T. baltica* in *Theodoxus fluviatilis* L. of the typical fresh water bodies of Poland, yet we were able to confirm its important occurrence in *Theodoxus fluviatilis* in the hill rivers Zeta and Morača in Crna Gora (Monte Negro), Yugoslavia, in the Spring 1960. The two rivers join above Titograd to fall then into the Skadarsko Lake (Skutari) bearing the character of violent hill streams flowing through calcareous areas where any influence of salt water from the sea is absolutely excluded. At the same time we learned from our friend Dr. J. Lom of Prague, that he came across a case of *Theodoxus fluviatilis* of the Bulgarian mountain river infected with *T. baltica*. And again: it is characteristic that Lom did not find these *Trichodina* in *Theodoxus* of the Czechoslovakian waters.

One could easily conclude on same rupture in the ecological range of occurrence of *T. baltica* in *Theodoxus*, its occurrence being limited to the brackish waters on one hand, and to hill streams, on the other. This hypothesis, however, can not be given serious consideration, until the situation in stagnant and running low land waters of Europe be investigated.

Below, comparative biometric data on *T. baltica* Quen. from *Theodoxus fluviatilis* of the Baltic Sea, on that of Żarnowieckie Lake, and that of the Zeta and Morača rivers are given for orientation and comparison.

T a b l e 1
Measurements of *T. baltica* Quen. in *Theodoxus fluviatilis*

Locality	Author	adhesive disc ♂	denticul. ring ♂	number of dent.	number of striae
Gulf of Gdańsk	Raabe & Raabe 1959	43 30 - 55	24 16 - 31	25 22 - 30	10
Żarnowieckie Lake - Poland	Raabe & Raabe 1959	32 - 32	16 - 30	25 21 - 29	10
Zeta river - Yugoslavia	Z. Raabe (1960)	40 - 53	19 - 34	21 - 33	10

Trichodina unionis Hampl 1955

This species was described by Hampl 1955 who found it in *Unio crassus batavus* Maton et Rackett, and in *Anodonta cygnea piscinalis* Nilsson from the environs of Erlangen, Germany. The scrupulous and conscientious description by Hampl does, however, not point to any morphological characters as would distinguish *T. unionis* from other species while the biometric data — besides the considerable dimensions — are not sufficiently distinctive. Besides, Hampl in preparing his drawings might be influenced by those published by Hirschmann et Partsch 1954, and prepared them rather conventionally as regards both the structure of the aboral ciliary apparatus and the shape of the links of the skeletal ring. Quite occasionally, good photograph of AgNO₃ impregnated specimen of *T. unionis* Hampl from Czechoslovakia was published by Lom 1960 in his studies on *Urceolariidae* of the fish bladder.

Our *T. unionis* material originated from *Anodonta cygnea* L. of the Żarnowieckie Lake in Pomerania, from *Unio pictorum* L. of the Pilica river, Central Poland, and — for sake of comparison — from *Anodonta cygnea* of the Balaton Lake, Hungary, and from that of the Skadarsko Lake, Yugoslavia. *Trichodinae* from all of these regions exhibited complete concordance in their main characters indicative of their doubtless belonging to one species; these characters were in accordance with both those communicated by Hampl 1955, and those apparent in the Lom's 1960 photograph.

Trichodina unionis Hampl 1955 is one of the largest species of the genus *Trichodina*. Body shape is typical of the genus, flat cylindrical; both of the surfaces — the oral and aboral one — being parallel to each other. Middle part of the oral surface, surrounded by an adoral ciliary spiral, is exceptionally little salient. Adoral spiral forms an bow of about 400° . Body diameter reaches — and often exceeds — $100\ \mu$, and body height — $20\ \mu$.

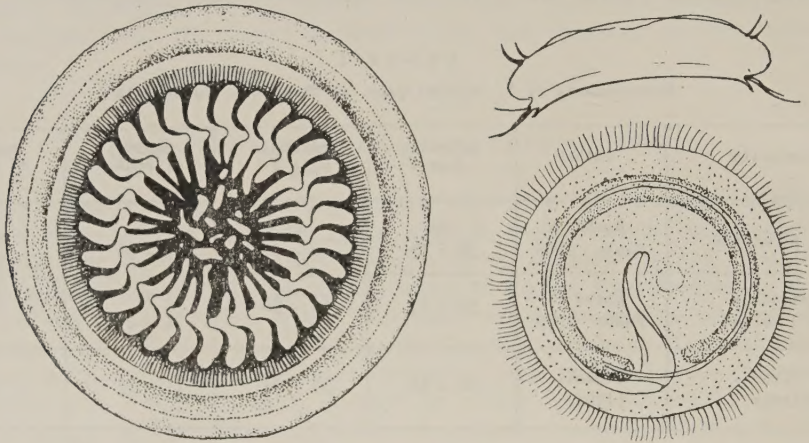


Fig. 1. *Trichodina unionis* Hampl: infravital drawing, lateral view; view from the oral side (I. H.); view from the aboral side (AgNO_3 impregnation)

In specimens observed in vivo, attention is attracted by the very distinctly outlined, particularly long and wide infundibulum and the remaining part of the oral apparatus; they form a very distinctly visible slot standing out against the background of plasm. On the contrary, the contractile vacuole is visible not as well and not as frequently. Plasm is colourless with more or less uniform granulation, especially on the periphery. Macronucleus a wide horseshoe, is 35 to $47\ \mu$ in diameter ($40\ \mu$ on most occasions), and 4 to $5\ \mu$ thick. Micronucleus is situated near one of its ends.

Adhesive disc is surrounded by a triple crown of cilia, typical of most *Trichodina*; it is very well distinct in this species on some occasions: inner cilia (14 to $18\ \mu$ long, after Hampl), ciliary girdle (18 to $23\ \mu$ long, after Hampl) and, finally, sparse and short marginal cilia (10 to $12\ \mu$ long, after Hampl). Shield of sucker is 52 to $72\ \mu$ in diameter (60 to $90\ \mu$ according to Hampl). Skelatal ring consists of 27 to 35 denticles (26 to 33 according to Hampl), with strong middle part, with wide, spatular, insignificantly bent, centrifugal hooks, about $8\ \mu$ in length and with thick, straight centripetal spikes about $8\ \mu$ in length too. There are 8 striae of striated band per denticle of skeletal ring.

Unevenness and irregular occurrence of the centripetal spikes, visible very well in AgNO_3 preparations, is a very typical character of *T. unionis*. They seem broken in various ways, and the ring they form seems gap-toothed. This character appears in various degrees, yet it occurred in all of the *T. unionis*

populations as were examined by us irrespective of their origin and was confirmed almost in each specimen. Light, rod-shaped formations were always visible in the centre of the dark central area of the sucker (where the spikes did not reach anymore) in the AgNO_3 impregnated preparations. Lom 1960 regards these formations as rudiments of the old ancestral (and resorbed) skeletal ring. He, doubtlessly, is right as far as other species of the genus *Trichodina* — and especially *T. urinaria* Dogiel — are concerned; as regards *T. unionis*, however, these elements rather resemble just the broken parts of spikes, the more so, as they correspond very closely to the broken up spikes.

Below, a table of biometric data is given in order to supplement additional information on the characters considered; the data concern populations of *T. unionis* Hampl from various water bodies.

Table II
Measurements of *T. unionis* Hampl in Unionidae

Hosts	Locality	Author	adhesive disc ♂	denticul. ring ♂	number of dent.	number of striae
<i>Unio crassus</i> <i>An. cygnea</i>	Erlangen -Germany	Hampl 1955	58 - 62	intern. 29 - 31	26 - 33	10
<i>An. cygnea</i>	Belaton lake - Hungary	Raabe & Raabe	62 52 - 72	37 30 - 42	31 27 - 35	+ 10
<i>An. cygnea</i>	Żarnowieckie lake - Poland	Raabe & Raabe	62 52 - 70	36 32 - 40	29 27 - 31	10
<i>Unio pictorum</i>	Pilica river - Poland	J.Raabe (1960)	63 52 - 75	36 32 - 45	30 26 - 34	10

Trichodina unionis Hampl occurs on the gills not very often, while it may be encountered somewhat more often on the labial palps of *Unio* sp. sp., and *Anodonta* sp. sp., especially in those from larger stagnant and running water bodies. Particularly abundant material available to the present authors originated from *Unio pictorum* L. of the Pilica river in Central Poland. Of a few thousands of *Unio* specimens examined, some 20 per cent were infected to an insignificant degree; in some 2 per cent an intense infection of labial palps occurred. There was no *T. unionis* infection at all in *Anodonta* from Pilica. Similarly, *Anodonta cygnea* L. in the Żarnowieckie Lake, Pomerania (Poland), and in the Balaton Lake (Hungary) was seldom infected; on the other hand, more frequent were the cases of infection in the Skadarsko Lake in Yugoslavia. *T. unionis* Hampl may thus be regarded as a species specific of Unionidae accompanying its hosts on a rather wide area of distribution.

Long-term observations carried out on living *T. unionis* Hampl material have disclosed a very interesting and unexpected phenomenon: more than on a dozen of cases, we happened to watch *T. unionis* eating up *Conchophthirus*

unionis Raabe, specific to *Unio*, and coexisting with *T. unionis* on the *Unio*'s, gills and labial palps. This was the more surprising as *Trichodina*, at general, were not considered capable of absorbing larger particles of food; bacteria and the shelling off elements of the host's epithelium were supposed to be the largest food particles. In the case reported here, however, the question was of organisms exceeding *Trichodina* in dimensions or at least, in length. On one occasion, we came across a *Trichodina* specimen with an *Conchophthirus unionis* individual as was only half-way swallowed by the former which, however, released its spoil being irritated by the manipulations with the preparation needle. The *Conchophthirus* specimen thus released could, however, live no more, while the *Trichodina* swam off after getting rid of the *Conchophthirus*. The body of *Trichodina* will deform very drastically with the *Conchophthirus* eaten up assuming the shape of the spoil and becoming immobile. The macronucleus pressed by the spoil, will stretch very markedly, the adoral spiral will also stretch and deform while the adhesive disc remains unchanged except for the surrounding cilia considerably slowing down their activity. Such a gorged *Trichodina* becomes almost absolutely immobile.

The ability of *Trichodina unionis* to eat up such a large booty as *Conchophthirus unionis* may be accounted for by the large dimensions and the doubtlessly considerable tensility of its infundibulum and pharynx (which may be noted in observations in vivo) on the one hand, and by significant elasticity and plasticity of the *Conchophthirus*' body, on the other. On the grounds of our observations, we can not admit this rapacity as accidental.

The results of the attempts with the stained preparations showed the digestion processes (even those of such large objects as *Conchophthirus*) to be very quick. In most of the preparations nuclear substance of *Conchophthirus* eaten up by *Trichodina* did not any more react to the nuclear stain, while the *Trichodina*'s nucleus stained very well. In our material, alongside numerous *Trichodina* specimens considerably inflated by the *Conchophthirus*, there were also many individuals with significantly less deformed body, with the shape of the swallowed infusorian scarcely perceivable.

Trichodina tranquillis sp. n.

Trichodina tranquillis sp. n. is a sufficiently large species with a flat body, however with a spherical apical part, surrounded by the spiral of adoral cilia. The adoral spiral is full, about 400°. Body diameter is 80 to 95 μ ; body height is 20 to 25 μ .

Characteristic, in living material, are the very short cilia; this seems to account for the sluggishness of this *Trichodina*. The plasma is fine-grained in the peripheral part, while it is vacuolized in the middle part containing numerous yellowish spherical bodies, being, most obviously, the *Zoochlorellae*. A small infundibulum and very clearly outlined contractile vacuole are sufficiently well visible among them. The macronucleus, resembling a wide horseshoe, almost closed up, is 60 to 70 μ in diameter. The micronucleus is located near one of the ends of the macronucleus.

The adhesive disc is surrounded by the typical threefold ciliary crown, the individual elements of it being, however, difficult to distinguish. The

disc of the sucker measures 64 to 76 μ in diameter. The skeletal ring consists of 28 to 32 links, with the centrifugal hooks very markedly crescent-like bent, 7 — 8 μ in length, and of straight centripetal spikes, about 8 — 10 μ in length. There are 6 striae of the striated band per denticle of the skeletal ring. As

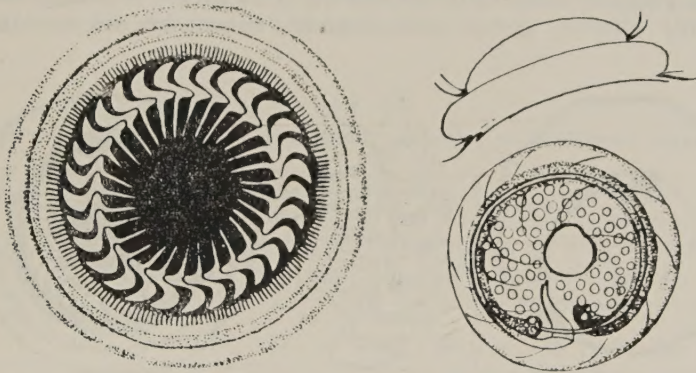


Fig. 2. *Trichodina tranquillis* sp. n.: infravital drawing, lateral view; view from the oral side (I. H.), view from the aboral side (AgNO₃ impregnation)

a rule, the centripetal spikes are even and well formed; yet, on some occasions gaps may be seen in this species too (much as in *T. unionis*). The middle part of the sucker, dark in the AgNO₃ impregnated preparations, sometimes contains rod-like formations that will not impregnate.

In the AgNO₃ preparations, peculiar striae may be normally observed on the apical shield, inside the adoral spiral; they are three or more in number and run obliquely from the spiral to the centre, being arranged like the sections of an iris diaphragm of an optical objective. Similar section may be seen outside the adoral spiral too. The present authors failed at explaining them exactly. However, these may be pellicular folds of contracted body which could then disappear in the gorged *Trichodina*.

The characteristic feature of *T. tranquillis* sp. n. stressed here and consisting in the occurrence of symbiotic *Zoochlorellae* in its plasm, is by no means a new character in *Urceolariidae*. *Zoochlorellae* do occur in *Urceolaria patellae* Cuenot from *Patella*; recently they were reported by Richards giving the precise data on its localization in the host's body; still, this could give some hints as to the significance of this symbiosis.

We used to find *Trichodina tranquillis* sp. n. exclusively in the mantle cavity of *Planorbis planorbis* L., in one body of water only, namely: a small forest pool near Nowe Miasto on Pilica (Central Poland). Especially frequently these trichodins occurred in the slime at the very edge of the shell. The infection was neither extensive (about 2 per cent of the snails examined) nor intensive (not more than 20 specimens in one host). On one occasion only, the infection bore mass character with more than 50 trichodins jeaping densely just on the edge of the mantle. This staying of *Trichodina tranquillis* sp. n. at the exit of the mantle cavity, in a place accessible to light, might be related to the symbiotic, autotrophic *Zoochlorellae* occurring in it.

Semitrichodina sphaeronuclea (Lom 1956)

This species was described by Lom 1956 who found it in *Bielzia coerulans* and in *Limax maximus* from the hilly regions of Bohemia and Moravia. Owing to the markedly reduced spiral confirmed by himself, Lom ranged it within the genus *Trichodinella* Šramek-Hušek (= *Brachyspira* Raabe), the then only known genus with reduced spiral; he did so disregarding

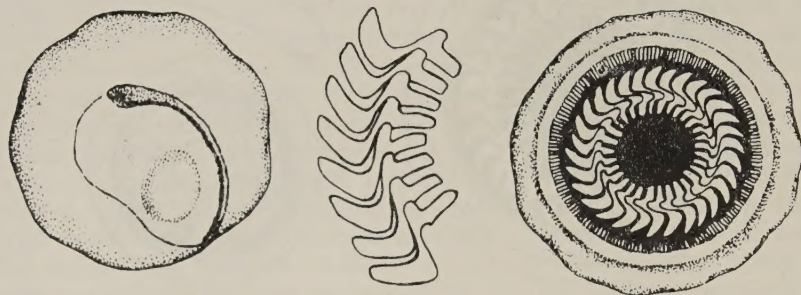


Fig. 3. *Semitrichodina sphaeronuclea* (Lom); from the oral and aboral side (AgNO₃ impregnation)

T. sphaeronuclea possessing both the centrifugal hooks and centripetal spikes of the skeletal ring. Kazubski 1958 who found this species in the mantle cavity of *Schistophallus orientalis* (Zonitidae) in the Bieszczady Mountains (the Carpathians), admitted this character as inconsistent with the species remaining within the genus *Trichodinella*, and created for it a new genus *Semitrichodina* in view of its deviating very distinctly from the remaining *Urceolariidae* representatives. Our material was collected in *Bielzia coerulans* Bielz of Gorce Mountains in the Carpathians.

The body of *Semitrichodina sphaeronuclea* (Lom) resembles a backer's roll or even a hemisphere with rounded edges, and is very flexible and plastic. The body edge is exceptionally distinctly wavy in this species, with a number of notches of folds running in bow-like from the edge towards the centre of the upper part of body. These notches may vary in number: 9 after Lom's 1956 estimation, 11 according to Kazubski 1958, while they numbered about 12 in our material. This figure may vary in populations from various regions and various hosts.

The upper, oral, body surface is distinctly salient and exhibits some dissymmetry, this salient part being somewhat larger on one side; this part is separated from the remaining part by an insignificant furrow surrounding the former. This excentrically situated part may be compared to a small cap set askew. On one side, this part is limited by a short section of an left-hand, double adoral spiral, which sets in on the body margin, and ends in the mouth opening almost in the middle of the oral surface of the body. Thus, the adoral spiral does not run parallelly to the body margin, but slightly obliquely. Its bow is about 110° according to Lom 1956, some 180° after Kazubski 1958 (in spite of the photograph), while it is approximately 100°

according to our own observations, i. e. rather in accordance with the Lom's data. From the mouth end of the spiral, a strong and well visible infundibulum leads deep into plasm.

The plasm is poorly granulated, transparent and clear: the contractile vacuole is situated almost centrally. The excentrically located macronucleus is ellipsoidal in shape and is $12\ \mu$ in diameter on the average; next to it is situated the micronucleus, some $2\ \mu$ in diameter.

Table III
Measurements of *Semitrichodina sphaeronuclea* (Lom) in different hosts

Hosts	Author	body $\emptyset$	adhesive disc $\emptyset$	denticul. ring $\emptyset$	Ma $\emptyset$	number of dent.	number of striae
<i>Limax maximus</i> <i>B. coeruleans</i>	Lom 1956	62 44 - 83	42 35 - 49	25 18 - 32	14 9 - 15	28 26 - 31	8
<i>Schistophallus orientalis</i>	Kazubski 1958	49 40 - 55	43 39 - 47	24 20 - 26	10 8 - 12	33 31 - 35	-
<i>Bielzia coeruleans</i>	Raabe & Raabe (1960)	60 50 - 70	49 47 - 52	26 24 - 28	+ 10	31 29 - 33	8

The adhesive aboral disc is surrounded by a complex crown of cilia; in the latter, marginal cilia can be distinctly discerned alongside the ciliary girdle on some occasions. The cilia accomplish quick wavy movements thus enabling the ciliate to move swiftly once in water. The skeletal ring of the adhesive disc is composed of denticles provided with strong blunt hooks, slightly declining (but not curved), and with equally strong short centripetal spikes with obtuse ends. The external "lip" of the link trunk itself is much more developed than the interior one with the spike of each link being not situated opposite the hook of the same link, but opposite that of the next one at least, or even the third one. Their shape may be very well seen in AgNO_3 impregnated preparations (which are, by the way, very difficult to obtain in our material). The middle part of the sucker is dark in these preparations. The striated band contains 8 striae per denticle. The biometric data are compared to those of Lom and Kazubski in the Table III.

The adoral spiral, and the adoral zone generally deserve particular attention in *Semitrichodina sphaeronuclea* (Lom). As was already stated above, the double left-hand ciliary spiral of this species forms a 100° bow which is situated not parallelly to the body margin, but centripetally, in contrast to all the remaining *Urceolariidae*, including the *Trichodinella* representatives with their significantly reduced adoral spiral forming an arc, approximately 180° to 270° . Consequently, the most reduced spiral is that of *Semitrichodina*, the arrangement of it being absolutely particular.

The structure, shape and the oblique disposition of adoral spiral may be well seen in the AgNO_3 impregnated preparation. Yet, in most of the preparations an additional thin impregnable line is visible which, so to say, continues the adoral spiral. This line then turns and forms a bow it returns

back to the body margin, to the initial section of the spiral. Thus, this line, together with the ciliary spiral, cuts out an elliptic area on the body surface of the protozoan; as compared to the upper surface, this area is shifted and touches the body margin. This area corresponds to the "cap" on the *Semitrichodina* body, and its limits - to the furrow cutting it off the remaining body. Lom 1956 did not mention this structure; neither did Kazubski 1958 (disregarding his own photograph of an impregnated specimen in which it is sufficiently well visible).

This structure seems not easy and simple to explain. The line as prolong the ciliary spiral and will disclose in the AgNO₃ impregnated preparations does not seem to be any definite pellicular or subpellicular structure, is apparently no fibril, and not always does appear as distinctly as the picture of the double adoral spiral does. Most likely, it is rather a remnant of the mentioned furrow as cuts off the elliptic adoral area. This furrow may be supposed to play a part in directing the food into the groove between the rows of cilia of the adoral spiral, and then — to the infundibulum. Probably, the above explanation is not the only one. We consider that both this furrow and the line as makes it visible in the impregnated preparations, represent traces of the old ancestral course of the adoral spiral which formed a circle of some 360° and almost enclosed the oral shield, the same as in most of the *Urceolariidae*. Thus, it would be perhaps not a rudiment but, at any rate, a trace of the initial part of that full adoral spiral, so characteristic of all of *Peritricha*, which possibly still continues to play some part in driving in food.

In *Trichodina urinaria* Dogiel from the *Perca fluviatilis* bladder Lom 1960 seems to have dealt with like structure the only difference consisting perhaps in their being more markedly expressed. For, Lom writes that the double adoral spiral of cilia makes 1.5 turn (about 540°) around the body in this species, the spiral being prolonged (or, from the physiological and mechanical point of view — preceded) by an Ag impregnable line making another half turn (about 180°). This line, exhibiting no kinetosomes, is interpreted by Lom as a rudiment of that part of the adoral spiral which probably formed more than two full turns in the ancestral forms of *T. urinaria* Dogiel, the same as the case is in representatives of the genus *Vauchomia*, such as *V. renicola* (Mueller) and *V. nephritica* Mueller living also in the bladder of fishes (*Esox* sp. sp.).

Indeed, it seems that in both of these cases, in *Semitrichodina sphaeronuclea* (Lom) and in *Trichodina urinaria* Dogiel as well, the question is of species in which reduction of the adoral spiral occurred which consisted in the shortening of the course of the latter; and that the lost part of the spiral left a trace in the form of a furrow with a line in it which is visible when silver impregnated.

Semitrichodina sphaeronuclea (Lom) occurs in the slime, in the mantle cavity or in the mantle folds of terrestrial *Pulmonata*. It is typical that it was found so far in species living in mountains, yet, belonging to various families: *Limax maximus* and *Bielzia coerulans* of the naked family *Limacidae* and *Schistophallus orientalis* of the *Zonitidae* family.

In our material, *Semitrichodina sphaeronuclea* (Lom) occurred particularly abundantly beneath the head fold of the mantle of *Bielzia coerulans*

Bielz. The specimens moved very slowly in the slime changing the shape of their very plastic body; they used to swim very quickly, with their adhesive disc forwards, when water was added to the smear.

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LITERATURE

1. Hampl A. — *Trichodina unionis* n. sp... Zool. Anz., 155, 1955.
2. Hirschmann H. u. Partsch K. — Ein einzelliger Fischparasit von überraschender Schönheit. Umschau, 55, 1955.
3. Kazubski S. L. — *Semitrichodina* g. nov. *sphaeronuclea* (Lom, 1956) in *Schistophallus orientalis* Cless. in Poland. Bull. Acad. Polon. Sci., Cl. II, 6, 1958.
4. Lom J. — Beiträge zur Kenntnis der parasitischen Ciliaten aus Evertrebraten. I. Arch. Protistenk., 101, 1956.
5. Lom J. — On two endozoic trichodinids, *Trichodina urinaria* Dogiel, 1940 and *Trichodina polycirra* sp. n. Acta Parasit. Polon., 8, 1960.
6. Precht H. — Epizoen der Kieler Bucht. Nova Acta Leopoldina, N. F. 3, 1935.
7. Quennerstedt A. — Bidrag till Sveriges Infusorie-fauna. III. Lunds Univ. Arsskrift, 6, 1869.
8. Raabe J. and Raabe Z. — *Urceolariidae* of molluscs of the Baltic Sea. Acta Parasit. Polon., 7, 1959.
9. Richards C. S. — Description and host relations of four new species of *Trichodina* from freshwater molluscs. Abstr. of Dissert. Stanford Univ., 24, 1949.

STRESZCZENIE

Autorzy podają wyniki swych dotychczasowych badań nad *Urceolariidae*, pasożytującymi w jamie płaszczowej i na skrzelach skłódkowodnych i lądowych mięczaków Polski. Omawiają następujące, znalezione przez siebie gatunki:

Trichodina baltica Quennerstedt 1869 z *Theodoxus fluviatilis*. Gatunek ten, znany dotychczas z wód słonawych i wód słodkich wykazujących wpływy morskie, został znaleziony przez autorów w *Theodoxus* z potoków Czarnej Góry (Jugosławia), co nasuwa nowe refleksje na temat jego charakterystyki ekologicznej.

Trichodina unionis Hampl 1955 z *Unio* sp. sp. i *Anodonta* sp. sp. Gatunek ten okazał się szeroko rozprzestrzeniony i swoisty dla *Unionidae* żyjących raczej w większych zbiornikach wodnych. Autorzy opisują interesujące, częste przypadki pożerania przez tego pasożyta większych od niego orzęsków — *Conchophthirus unionis* Raabe, występujących masowo na skrzelach *Unionidae*.

Trichodina tranquillis sp. n. z *Planorbis planorbis*. Autorzy podają opis nowego gatunku, zwracając szczególną uwagę na występowanie w jego ciele symbiotycznych *Zoochlorellae*.

Semitrichodina sphaeronuclea (Lom 1956) z *Bielzia coerulans*. Autorzy zwracają uwagę na swoje struktury, towarzyszące skróconej spirali adoralnej tego orzęska, opierając na nich wnioski, dotyczące dróg rozwojowych w obrębie rodziny *Urceolariidae*.

EXPLANATION OF PLATES I AND II

Phot. 1. and 2. *Trichodina unionis* Hampl: from the aboral side, AgNO₃ impregnation.

Phot. 3. *T. unionis* from the oral side, AgNO₃ impregnation.

Phot. 4 and 5. *T. unionis* with *Conchophthirus unionis* eaten up (I. H. stained preparations).

Phot. 6 and 7. *Trichodina tranquillis* sp. n.: Typical view of the oral and aboral sides (AgNO₃ impregnation).

Phot. 8 and 9. *Semitrichodina sphaeronuclea* (Lom): the aboral side (AgNO₃ impregnation).

Phot. 10 and 11. *S. sphaeronuclea*: the aboral side of two individuals (AgNO₃ impregnation).

